

1. A method for satellite positioning using positioning signals which are sent out by the various satellites of a satellite constellation under the control of a set of ground stations from which said satellites receive control signals, and which are available to be picked up by individual user receivers, which method consists essentially:

10 - emitting, from said set of ground stations, periodically renewed direct transformation functions which are addressed respectively to each said satellite of said satellite constellation and applying the direct transformation function received by each satellite to encode the positioning signals emitted therefrom;

15 - and further, upon each request from a user receiver addressed to a user servicing station, verifying that it has right to a privileged-user status and, in the event that the verification is positive, addressing to said user receiver reverse transformation functions that are inverse to the direct transformation functions applied at the satellites from which it receives positioning signals, whereby said reverse transformation functions constitute an interpretation key for interpreting said positioning signals by applying said reverse transformation functions 20 for decoding them.

2. The method as claimed in claim 1 comprising a prior stage of registering a mission declaration comprising a route plan to be followed by the user,  
- and wherein each request from a user receiver calling for 30 said interpretation key includes a copy of the latest coded positioning signals it has picked up from the satellites,  
- and the verification of the privileged-user status comprises the sub-stages consisting in decoding the said coded positioning signals included in said request, in

deducing therefrom the position of the receiver and in verifying that this position is in conformity with the route plan.

3. The method as claimed in claim 1 further comprising a prior stage wherein an identifier is supplied to the user during a mission declaration by this user, and wherein said identifier is broadcast to various user servicing stations to which the said user receiver is likely to address a request calling for the interpretation key.

10 4. The method as claimed in claim 1, comprising priorly supplying an encryption code to the user during a mission declaration by this user, and wherein the user servicing station receiving said request uses said encryption code to send the interpretation key to the user receiver.

15 5. The method as claimed in claim 4, in which said encryption code is used for an authentication process carried out by the privileged-user receiver by comparison between the signal carrying the interpretation key received from the user servicing station in response to said request and said encryption code, the latter being known to the privileged user.

20 6. The method as claimed in claim 1, further comprising a preliminary stage of invoicing the user benefiting from the privileged-user status.

25 7. The method as claimed in claim 1 wherein, in order to ensure verification of authenticity and integrity of the positioning signals interpreted, a comparison is carried out by the privileged-user receiver between the signals received from the satellites and the signals received from the services station processing said request, in order thereby to verify the presence of the same specific fragment respectively accompanying the positioning

signals sent out by each satellite and the interpretation key addressed to the user receiver in response to its request.

8. The method according to claim 1, further comprising:

- including, in each request calling for the interpretation key sent by said privileged-user receiver, a copy of the latest positioning signals received by said receiver, in their transformed form,

10 - decoding at the ground stations the transformed positioning signals included in said request, and deducing the position of said receiver therefrom,

15 - calculating a degree of precision of said positioning signals as a function of said deduced position and/or of the operational state of the system,

- and addressing to said receiver an information of the degree of precision thus calculated.

9. The method of claim 1 wherein each request originating from a plurality of user receivers includes a copy of the latest coded positioning signals received by the receivers, and further comprising decoding the transformed positioning signals included in each request, deducing therefrom the positions of the various corresponding receivers, and addressing to at least some of said user receivers a position information relating to other users among said plurality.

10. The method of claim 1 wherein each request originating from a plurality of user receivers includes a copy of the latest coded positioning signals received by the receivers, and further comprising decoding the

transformed positioning signals included in each request deducing therefrom the positions of the various corresponding receivers, and addressing to a traffic control service a position information relating to the position of at least some of said user receivers among said plurality.

11. The method of claim 1 wherein a basic interpretation key is delivered to any user having a right to at least a first degree of precision in interpreting the positioning signals, and a supplementary interpretation key granting access to a higher-level quality of service, especially via a better degree of precision, is reserved for the users having the benefit of a second privilege.

12. The method as claimed in claim 1, wherein each transformation function participating in the definition of the interpretation key is announced to the user servicing stations with an advance in time with respect to its application to the positioning signals sent out by the corresponding satellite.

13. The method as claimed in claim 1, wherein the request signal for the interpretation key sent out by the user receiver and intended for a user servicing station comprises a copy of the positioning signals emitted from a plurality of satellites as received by said user receiver, and wherein the signals thus recopied are processed by said user servicing station applying to them said interpretation key to determine the position of the said user receiver for use for recognition of the privileged-user status or for any other monitoring purpose.

14. The method as claimed in claim 13, further comprising acquiring again positioning signals by the user receiver from said plurality of satellites after reception of said interpretation key constituted by the set of relevant reverse transformation functions, and applying the latter to

the positioning signals newly acquired, and deducing therefrom a new position information, thereby avoiding that movement of the receiver during the propagation of the signals and the processing of the requests result in  
5 reducing the precision of the position information.

15. A system for positioning by satellites in a security-protected system for assisted navigation,

comprising a constellation of orbitting satellites,  
each including means for emitting positioning signals  
10 deduced from control signals which they receive from a set  
of ground stations also in communication with each other,

wherein, for at least one user receiver having  
means for acquiring said positioning signals for use in  
interpreting them in order to calculate a position  
15 information, said user receiver further comprises emitting  
means for sending to said set of ground stations a request  
signal calling for an interpretation key which is necessary  
for it to have access to a privilege in using said  
positioning signals which is reserved for privileged users,

20 and wherein said set of ground stations comprises  
at least one user servicing station including receiving  
means for receiving said request, calculating means for  
verifying, using said request whether the user for said  
user-receiver possesses a privileged-user status allowing  
25 him to said privilege, and emitting means for addressing  
said interpretation key (33) to said receiver, in the event  
that the verification is positive.

16. A positioning system as claimed in claim 15,  
wherein each privileged-user receiver further comprises  
30 means for receiving the interpretation key addressed to it  
from said services station in response to its request, and  
calculating means for combining said positioning signals

with said interpretation key and deducing therefrom said position information.

17. A positioning system as claimed in claim 15,  
5 wherein said interpretation key consists of defined reverse transformation functions which are the inverse of direct transformation functions applied respectively by the various satellites within range of said user receiver for emitting the positioning signals sent therefrom.

18. A positioning system as claimed in claim 17,  
10 wherein a master station among said set of ground stations comprises:

- means for generating the direct transformation  
functions to be applied at said satellites for deriving said  
positioning signals and addressing them to the various  
15 satellites for which they are respectively intended, in  
addition to the usual control signals such as their orbital  
parameters and synchronization information,

- and means for calculating said reverse  
transformation functions and for broadcasting them any  
20 user servicing station within the system for using them in  
deriving and transmitting the interpretation key necessary  
to each user receiver sending a request to that effect,  
subject to the verification that the corresponding user is  
allowed the privileged-user status.

25 19. A user receiver for use in a satellite-navigation system enabling to reserve an access privilege to privileged users in at least one geographical area covered by the system,

30 which, in addition to means for acquiring positioning signals from a plurality of satellites within its range, includes request emitting means for sending to a

user servicing ground station a request signal calling for a key for interpreting said positioning signals, said key comprising reverse transformation functions for inverting direct transformation functions which are applied respectively by the various satellites in its range for emitting the positioning signals sent therefrom,

and which further includes calculating means for processing said positioning signals having undergone the direct transformation functions by applying to them the corresponding reverse transformation functions in said interpretation key once it has been received, and for deducing therefrom a position information obtained by interpreting said positioning signals.

20. A user receiver as claimed in claim 19, comprising means for automatically repeating the emission of said request signal with a predefined periodicity.